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Weather, Land Satellite Sale

President Ronald Reagan announced on March 8 plans to sell to private industry the nation's land and meteorological remote-sensing satellites, including the respon-sibility for any future ocean-observing systents. According to the plan, the private firm successful in its bid to buy the live satellites would sell back to the government the data received by the satellites. The Reagan administration says the sale will save money and will put activities appropriate for commercial ventures into the commercial sector. Response to the announcement from scientists and congressmen has been anything but dulcet; one senator, in fact, charges that the Commerce Department and the corporation most likely to purchase the satellites are engaged in a

'sweethcart deal.' Immediate concerns expressed by scientists and congressmen over the sale of the satellites include the potential for interruption of service resulting from corporate financial difficulties or labor disputes; the possible dis-ruption of information flow to international users of U.S. satellite data; the possibility of data being subject to copyright; and the ques-tion of a commercial satellite company having a monopoly on the satellite data essential to the U.S. government. Critics also question whether the government will save any money by selling the LANDSAT land remote-sensing satellite, the two polar orbiting satellites, and the two geostationary operational environmental satellites (GOES).

The National Weather Service (NWS). within the Commerce Department's National Oceanic and Atmospheric Administration (NOAA), would not be dismantled or sold, according to NOAA Administrator John V.

The plan to sell the satellites, according to NOAA officials, was prompted by the Office of Management and Budget (OMB); OMB wanted to eliminate the costly LANDSAT program, which supplies information used by, among others, seismologists, geologists, farmers, and urban planners. However, because the market for the LANDSAT data is small, commercial ventures were reluctant to buy the satellite but were more interested in purchasing the weather satellites, thereby buying Into the huge market for weather in-formation. According to one current estimate, the public spends \$100 million a year accessing prerecorded telephone weather information, and the media spends \$1.7 billion to disseminate weather information. NOAA Administrator Byrne noted that bids would be accepted only from U.S. firms and would be accepted for either the weather satellites, the land satellite, or all of the remote-sensing

satellites. The Communications Satellite Corporation, better known as Comsat, is considered the frontrunner among the firms that would be willing to buy the remote sensing satellites. In fact, Comsat made a proposal to the govern-ment in the spring of 1981 to purchase both the land and metcorological satellites. That proposal reportedly states that Comsat would be willing to buy the satellites if the government would gnarantee that it would pay roughly \$300 million a year for 15 years. In a statement issued in response to Reagan's an-nouncement, Comsat said that 'such a transfer is possible without a disruption in the service provided to national and international osers and will ensure the continued development in the U.S. of this very important (satelite) technology.' A Comsat spokesman soid it would be premature to comment on any possible savings that might accrue to the govern-

ment as a result of the sale Much of the criticism of the plan stems

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from the apparent lack of a cost-benefit analysis to determine if the government would in-deed save money by selling the satellites. At a March 14 Senate hearing on the NWS bud-get, Sen. Larry Pressler (R-S,D.) revealed that the Commerce Department was sent a report in Norember from the Department of Defense and the National Aeronautics and Space Administration (NASA) claiming that the government would spend more money buying back weather and land data from private companies dian would it would spend if the government kept the satellites. In spite of this report's analysis, Pressler says, the Rea-gan administration has gone ahead with plans to sell the satellites. The South Dakota sena-

ior accused the Commerce Department and

Comsat of being involved in a 'sweetheart

Dated November 10, 1982, the report referred to by Pressler was sent to Assistant Deputy Secretary of Commerce Michael Bay er from Major Ceneral Earl G. Peck of the Defense Department and Kathleen Charles of NASA. According to Kevin Schieffer, legislative assistant to Pressler, the report is a 'broad-base analysis' based on reports requested from more than a dozen companies on the pros and cons of the commercialization of land and weather satellites. However, the existence of the report, or any other study on the cost effectiveness of selling the satellites to the private sector, was not known to any of the more than a dozen witnesses testifying in mid March in House and Senate hearings on the proposed fiscal 1984 budget for NWS. Though labelled 'official use only,' the Peck-Charles report contains no propri-etary information, Schieffer said. Pressler has requested that the Senate Committee on Commerce, Science, and Transportation ask Bayer to make the report available to scienrists and others for evaluation of the costs and benefits of commercializing the remote

sensing saiellites. Pressler, whose home state is also home to the Interior Department's EROS (Earth Resources Observation Systems) Data Center, introduced into the Senate on February 15 a bill (S. 480) to block the Secretary of Commerce from transferring the ownership or management of any civil land or meteorologi cal remote sensing space satellite system and associated ground equipment without congressional approval. Rep. Roy P. Dyson (D-(d.) introduced a rompanion bill (H.R. 1958) in the House on March 8, the day of Reagan's announcement. Bodi bills have been sent to committee. Hearings on the proposal have not been scheduletl, but are likely to be held in late spring following budget delibera-

UCAR Group Urges **STORM Program**

A blue-ribbon panel of scientists has proposed a decade-long, \$1 billion program to improve forceasting operations and research of regional and local hazardous weather. The panel, appointed by the University Corpora-tion for Atmospheric Research (UCAR), believes that the program could reduce the \$20billion annual cost of damage from severe

weather by \$1 billion per year.

The primary aim of the program is to 'enable weather services, public and private, to observe and predict stormscale weather pluenomena-such as squal lines, thunderstorms flash floods, local heavy snows, or tornadoes-with the accuracy and reliability to protect the public, serve the national economy, and meet defense requirements, as explained in the report, The National STORM (Stormscale Operational and Research Meteorology) Program: A Call to Action. Stormscale phenomena also include nonviolent weather: freezing rain, dense ground fog, low-lying clouds that dis-rupt ground or air traffic, persistent temperature inversions, and strong nocturnal cooling that may produce killing frost.

'Stormscale phenomena are closely related to large-scale weather, according to Ceorge S. Benton, professor of meteorology at the Johns Hopkins University and chairman of the UCAR committee, who testified before the House Subcommittee on Natural Resources, Agricultural Resources, and Environment on March 9. 'It is the distribution of large-scale cyclones and anticyclones—low and high pressure areas—that determines whether a broad region has predominantly stormy or fair weather. But it is the occurrence,' he continued, 'of stormscale phenomeng which determines the particular [sic] local ity within the stormy region that experiences the devastating flash flood or the destructive windstorm. Stormscale phenomena are embedded within the large-scale weather pat-terns, and it is often the specific location and time of occurrence of the stormscale events, that are of the greatest concern to our citi-

The operations portion of the National STORM Program alms to deploy the technol ogy essential to gathering, analyzing, predicting, and disseminating small-scale weather information; the research portion, on the other hand, would ensure that the new-generation, high-technology operational system would be used to its maximum benefit. The research portion of STORM also aims to train forecasters to use the new predictire techniques.

Editorial

On Beginning A Career

At the 1982 ACLI Fall Meeting, about 50 young men and women attended a panel discussion entitled Doubts and Discouragements: Beginning a Career' spon-sored by AGU's Education and Human Resources Committee. The panelists (Joyce Blueford, U.S. Geological Survey; Constance Sancetta, Lamont-Doherty Gcological Observatory; and Percy Donaghay, University of Rhode Island) focused the wide ranging discussion on the special problems of graduate study and early pro-

8lueford urged students to assess all of the possible careers. Too often students are exposed only to the academic teaching and research role. She suggested that each person periodically outline his or her own prioritles and lifestyle to see what type of ob fits, pointing out that one's desires and ideas change as one develops. To find one about job advantages and drawbacks, she suggested that one should contact graduates of one's school to see what they have done. Once the job type is determined, the young person must develop the right image, work hard, and make contacts to get alread.

Sancetta discussed some of the problens encountered by graduate students. She felt that some drop on because they are uncertain of the direction in which they want to go. Others doubt their own ability to do creative, independent science, She stressed that these floubts are common to everyone, and that goals and confidence solidify as one advances. Another rommon feeling is that of being ignored and geiting little support from advisorsthe 'I don't get no respect' syndrome. The suident feels isolated and thinks that no one really cares how he or she is cloing. It is important to talk about these feelings and ask for help, she said, 'The faculty may be mure supportive than you think, but they don't automatically know how you feel; you must go and tell them.

Donaghay outlined the problems of the

young professional trying to become es-tablished in a crowded field. He suggested that if one goes for 'hard money' (income provided by guaranteed salary) in academics, it means taking a heavy teaching oad, which eliminates most of the research time, only to be told at promotion time that 'teaching counts for nothing: promotion is based upon publication. Pery advised future assistant professors to check the history of promotion at each school, since standards differ. A 'soft money' (Income contingent on grants) research job is often an umbrella project, in which several young scientists cooperate under the guidance of a senior scientist. This is very appealing; someone else worries about the funding while you are doing exciting work on the cutting edge, but the young scientist runs the risk of becoming

You must identify yourself as a unique

scientist doing unique work,' said Don-aghay. This can be done by giving talks at meetings and seminars at other institu-tions and by publishing papers on which you ore sole author. However, as you begin to define yourself you will come in conflict with established people whose ideas you question and with whom you start to compete for funding. 'You are bound to step on a few toes sooner or later if you do exciting work, and you will have to realize that that's the way science grows and not be crushed by the fights

Remarks by members of the audience brought out several points. An older woman suggested that young scientists adopt o mentor, an older and more experienced person willing to give advice, Introduce one to senior rolleagues, and explain how the system works. Several people noted that nice guys can finish first; that it is possible to be successful and self-confident while retaining a concern for others. Most students in the audience seemed to see their advisors as insensitive egotists making rigid demands; many expressed a desire that faculty give those who will not go into academics more information on alternative careers. Dr. Barbara Emery of the National Center for Atmospheric Re-search said that she had found teamwork boring when she performed only her part of the routine; once she took die initiative to shoulder more responsibility she enjoyed it much more. Dr. Louise Levien of Exxon Production Research Co. 11rged people not to give up if the first job is disappointing. 'Cive science another chance in another place before you decide it's not for you.

A problem which was discussed at some length is one of concern to young women: die apparent impossibility of sustaining a full-time, demanding job and also having a family. Aside from the personal joy of having a family, it was felt that parenting is an important contribution; but the system at present does not allow for parttime workers, who may proffice less per year but are still doing valuable research. A different standard of promotion or award might be applied to such people, although it is hard to know what the standard might be; it would represent a basic change in the system. Those women who have been most successful have either been young when they had children and then worked very hard 10 catch up, or had children after they had become established. The panel cautioned young women not to set unreasonable goals for themelves, but to find a workable way to satis-

fy both parts of their lives. The Committee plans to hold another panel at the 1983 ACU Spring Meeting, with apeakers from academia, government agencies, industry, and consulting firms to discuss the relative advantages and drawbacks of projects agencies. backs of various career directions.

> Constance Sancetta, Member Charles Hollister, Chairman AGU Education and Human Resources

program and closely link the research and Accurate stormscale weather forecasting will become a reality provided that the tech operations portions, Benton emphasized at a nology available to weather services is im-proved in four fundamental ways' under the recent press conference to unveil STORM. No matter how good the predictions, they are of no value unless they can be transmitted eradonal part of the STORM program, the UCAR committee states in its report. First, rapidly by trained meteorologists to those people who need and use them, he noted. The UGAR committee believes that three existing remote sensing systems must be better utilized to improve the observation of key ingredients have primed meteorology for stormscale weather systems. In particular, a a successful stormscale program: 'vastly immodem radar network is needed. Second, better communication and processing systems proved understanding of and ability to premust be made available to the forecaster, the dict the large-scale motions of the atmocommittee contends, to permit the rapid and sphere; the technology to observe, analyze, accurate diaplay and analysis of local Information from several sources. Radar or tion with a level of sophistication substantially satellite pictures, for example, would show greater than would have been possible only the derelopment and movement of stormsten years ago'; and the 'availability of imcale phenomena. Third, forecasters need betved romputers. ter ronceptual and numerical models to pro-vide a stronger foundation not only for short-term forecasts, but also for application to forecasts of greater than 12 hours. Last, the committee says that equipment and systems must be installed to help forecasters prepare

and rapidly distribute stormscale weather predictions that would be meaningful to the According to the recently published report, the six-plank research program alms to (1) improve understanding of local and regional weather phenomena and to apply this knowledge to a variety of closely related fields; (2) develop and evaluate local and regional weather prediction models; (3) develop stormscale monitoring and forecasting capa bilities applicable to data sparse areas; (4) develop and test new observing systems; (5) test and evaluate systems of data assimilation, archival, and display; and (6) develop techhiques of educading and training meteorologists in stormscale weather forecasting.

At least seven major federal departments and agencies would be closely involved with the program: the departments of Commerce (in particular, the National Oceanic and Atospheric Administration), Defense, Interior, and Transportation, the Environmental Protection Agency, the National Aeronautics and Space Administration, and the National Sci-

ence Foundation (NSF). The UCAR committee encourages these agencles and departments to establish a program coordinating of-fice as the next step in the STORM program's development. The committee also recommends that o scientific organizing committee be established within the National Academy of Sciences within the next few months and that a program advisory commit-tee be assembled within 1983 for more detailing program planning. UCAR, a consortium of 50 universities that manages, under contract with NSF, the National Center for Atmospheric Research (NCAR), was a catalyst in developing the National STORM Program.

The three latter objectives are vital to the During 1983-1986, the first of three pro-

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posed program phases, the first multi-scale field experiment would be planned, a small field program with limited objectives would be conducted, and data sets would be analyzed. During the second phase (1987-1991), The later multi-scale field experiments would be planned and conducted, and analysis of the data from these experiments would begin. The last phase of the peogram (to extend as late as 1995) would see the analysis of the data from all of the experiments completed Throughout the entire period, other re-search—including modeling studies, technology development, and the transfer of information and techniques to the operational rom-munity—would be conducted.

In addition to chalrman Benton, the National STORM Program committee also includes Ernest M. Agee (Purduc University); Richard A. Anthes (NCAR); Lance F. 80sart (State University of New York at Albany); Michael Fritsch (Pennsylvania State University); Peter V. Hobbs (University of Washington); John Hovermale (National Meteocological Center); Robert McClatchey (Air Force Geophysica Laboratory); laidoro Orlanski (Geophysical Fluid Dynamics Laboratory); Frederek Sanders (Massachusetts Institute of Technology); Robert J. Serafin (NCAR); Patrick Squires (NCAR); and Verner E. Suomi (Uni versity of Wisconsin-Madison).—BTR

Sunspots Affect Insolation

The notion of a rigorously constant amount of solar radiation reaching the earth was upset recently by a team of scientists at the National Center for Atmospheric Research (NCAR). John Eddy, Kunski Gilliland and Douglas Hoyt of NCAR's High Altitude Observatory report that sunspots, which speckle the sun's surface in a fluctuating Hyear cycle, diminish the amount of sunlight reaching the earth. Their conclusion, which may radically affect global climate modeling, is based on data gathered from the Solar Maximum Mission (SMM) satellite and their nwn solar blocking model.

Data rollected by the SMM satellite reveal that only a small fraction of the energy blocked by aunspots is balanced by unmedi ate, enhanced emissions from bright areas on the sun. Moreover, solar energy can remain trapped in the sunspots, witich have an average diameter of 9000 km, for years. Blocked radiative energy can be stored in the lower convective zone of the sun and have a 'relaxation-time scale' of 100,000 years, during which time it may slowly seep our. Fluctuat ing solar output affects the accuracy of global climate models that forecast long-term effects on the world's weather: Weather and climate are determined by the circulation patterns of the oceans and air, which are driven by solar energy coupled with the cotational inertia of

the spinning planet.
The NCAR scientists compared data obtained from the Active Cavity Radiometer Irradiance Monitor (ACRIM) aboard the SMM satelfite with terrestrial surface temperature data and, using their solar blocking model, successfully duplicated the patterns of energy fluctuations. They can now predict the shortterm excursions in solar radiation a few days in advance, the scientists say, based on measurements of sunspot areas and their locations along with the known rotational peoperties of the sun. In addition, they can reconstruct the history of past fluctuations in solar radiation from the archived sunspot data of

Launched February 14, 1980, the SMM satellite has detected variances of 0.1% in solar energy output. Such fluctuations correspond to a change of 10 °C in the average temperature of the sun, which is 5700 °C. If the variance is persistent, the scientists say, the earth's surfare will respond directly and predictably: global cooling will follow a decrease in solar radiation and global warming will fol-

Thenretically, fluctuations in the release of solar energy can affect climate profoundly (Eos, August 26, 1980, p. 596). Mean global lemperatures would doop more than I °C in response to a 1% decrease in nutput of solar radiation. A drup in output of energy of ordy 6% would cover the entire earth with ice.—

Long Valley Earthquakes Wane

The intense awarm of earthquakes that began January 6, 1983, in the Long Valley region of eastern California continues to abate. The rate of earthquakes of magnitude 1 or greater (Richter scale) fell to 24 per day by February 8, compared to 100 per day in late January and 1000 tremblers recorded on January 7. Prior to the current swarm, the average daily number of magnitude I or greater quakes was 8-10. The area has experienced more than eight seismic swarms since the four magnitude 5.6-6.1 carthquakes of May 25-27, 1980, that occurred in the southern part of the Long Valley calders. Early gcound deformation measurements indicate

limited movement of magma deep within the

However, despite the current abatement, recent brief flurries of activity were recorded when two magnitude 4 and one magnitude 3.5 earthquakes occurred on February 3 and 4, reapectively. In addition, a magnitude 4.1 earthquake was recorded on February 24.

The seumic activity that began in January has resulted in ground extensions of 3 cm in 6 km and uplifts of 8 cm as indicated by laser-distance measurements and precision surveying. According to U.S. Geological Survey (USGS) seismologist David P. Hill, the changes are more pronounced near the epicentral region which is 3 to 8 km east of the town of Mammoth Lakes. The town is located on the southwest edge of die 17 km by 32 km elliptical caldera. Spasmodic tremors álso

have been recorded at this site. Volcanologists consider spasmodic tremors as indicative of rock fracturing caused by the movement of magma or magmatic gases (Science, June 18, 1982, p. 1902). Reanalysis of the May 1980 earthquakes indicates that they were the result of a rapidly expanding crack that immediately filled with fluid. A USGS preliminary model to account for the latest deformation suggests movement of up to 20 cm on the seismically defined fault zone, accompanied by up to 76 cm of opening within that zone. The right-lateral slip movement is consistent with the seismically determined mechanism for the earthquakes according to

Previous seismic studies revealed the exisience of a magma chamber near the town of Mammoth Lakes. Approximate measurements place it at a depth of between 8 km and 15 km and a distance across of 10 km. The 1980 tremors and the appearance of steam vents in January 1982 in the caldera region indicated to researchers that magma from deep in the earth was moving upward (Science, June 18, 1982, p. 1302).

Despite the recent decline in seismic activity, die Long Valley-Mammoth Lakes area remains covered by a notice of potential volcan ic hazards issued by the USGS in May 1982. The region also is under an earthquake hazards watch, which has been in effect since

Wet February for Nation's Streams

February marked a very wet month for the nation's streams with 97% of the key index gaging stations across the country reporting average to above-average streamflow, according to the U.S. Geological Survey.

USGS hydrologists said that the only stations that reported below-normal conditions for February twere one gaging station each in New York, New Jersey, Ohio, and Alaska and all four of the key index stations in the Ha-

The near drought conditions on the Hawaiian Islands were a strong contrast to the generally wet conditions across the continenial United States. All four of the key Index gaging stations on the Islands reported streamflows well below sverage for February. On the large Island of Hawaii, the key index gage on Waiakea Stream near Mountain View reported several days of zero flow during the month. Kilauea Volcano, located on the 1sland of Hawaii, has erupted several times during the past two months, and the lack of ntolsture combined with the intense heat from the lava flow increased the threat of

Pegetation fires on the island.

As an indication of the nation's generally plentiful water picture, combined flow of the nation's '8ig Five' rivers—Mississippi, St.

Lawrence, Cohumbia, Ohio, and Missouri—averaged 889 billion gallons a day (bgd), 11% egetation fires on the island. above the long-term average for February. The Big Five, which together drain more than half of the conterminous United States, provide hydrologists with a convenient check on overall national water conditions.

February marks the ninth straight month that the combined flow of the 8ig Five has been above average. Near the end of February, total daily flow of the Big Five was running 24% above the long-term combined monthly average, indicating that wet condi-llons could extend at least into early March.



Increased streamflows in February helped to halt a developing drought threat along much of the East Coast and inland to muthern Alabama. All but twn of the 31 key index gaging stations in New York, New Jersey, sylvania, Maryland, Virginia, West Viiginia, Kentucky and Tennessee reported average to above-average streamllum thiring February. In contrast, during January each of these states had reported well-below average

atreamflow at one or more index stations. Working in cooperation with federal, state and local officials, USGS hydrologists rentine collect data on streamflow and ground-water conditions at more than 45,000 sites across the country. Highlights of Felanary water conditions:

Big Five: Individual February llows-Misppi River near Vicksburg, Miss., 194 ligd, 13% above average, but down 27% front Jan-uary's flood volume; St. Lawrence River near Massena, N.Y., 158 bgd, 5% above average and 6% above the January average Ilow; Columbia River at The Dalles, Ore., 89 bgd, 33% above average and 8% above last month's flow; Ohio River at Louisville, Ky., 88 bgd, 22% below average, but up 44% from the january flow; and the Missouri River at Hermann, Mo., 60 bgd, 87% above average and 17% above last month.

Ground-water conditions: Ground-water conditions varied across the cumtry. The water level in key index wells in Kentucky, Nebraska, North Dakota and Nevada set new record bighs for February. All four uf the key index wells in North Carolina reported water levels that were one to four feet above the long-term average. Ground-water conditions in Delaware and Maryland remained well below average, with one key index well near Fairland, Maryland, reporting the 29th consecutive month of below-average water levels. The water level in a key index well near El Paso, Texas, fell to 78 m below the land surface, the lowest level reported at this well in 18 years of record.

Detecting Electron · Precipitation

Preliminary results were recently reported from the Navy's Stimulated Emission of Energetic Particles (SEEP) satellite regarding thetection of stimulated magnetospheric electron precipitation from ground based Navy VI.F transmitters (Eos, January 18, 1983). The results, first released at the AGU Fall Meeting. were obtained on passes during mill-August 1982, using coded transmitter pulses with a duty cycle of 3 a 'on,' 2 a 'off.'

We note here that a similar experiment type conducted by the National Aeronautics and Space Administration (NASA) using loty-cost, recoverable rocket payloads from Wallaus Island, Virginia, during late June and early July 1982. These flights also used the Navy VLF transmitter (NSS) at Annapolis, Muryland, with the same coding as that used for the later SEEP experiment. Participants in the NASA experiment incittded scientists from Goddard Space Flight Center, Denver University, and Cornell University. The results of this experiment, also reported at the AGU Fall Meeting, show evidence for pulsed electron precipitation patterns with the sume period as the transmitted VLF joilers. These results were accomplished by sensing the bremsstrahlung X rays produced when the electiona reenter the atmosphere. A zenitliviewing, wide angle X ray detectur was stabilized with a slow descent oboard a parachitte hung payload; this peroxitted a statistical build-up of the X ray signals over thirty 5-s cycles, a benefit not affurded by a fast moving satellite. Cross correlation analyses of the X ray data with the transmitted signal clearly lemonstrated the existence of this effect at a detectable level under nighttime conditions. The SEEP results, which mensured the precipitating electrons in situ, are consistent with

these earlier NASA fittdings. The NASA result was use role of both antheopogenic and natural VLF sources as a magnetospheric stimulant. In particular, lightning appears to be a reason able candidate for producing a continuous stream of magnetospheric electron drizzle, since approximately 2000 thunderstorms occur over the globe at any Instant. Comparisons of the VLF energy from the VLF transmitter to that from lightning were made with onboard VLF receivers and show the lightning source to be larger on average by a fac-tor of 10. More details on the NASA results can be found in an upcoming issue of Science under the title 'Contcolled Stimulation of Magnetospheric Electrons by Radio Waves: Experimental Model for Lightning Effects' by R. A. Goldberg et al.

This news item was submitted by R. E. Hartle of the NASA/Goddord Space Flight Center, Labora-tory for Planetary Atmospheres, Greenbell, MD 20771.

Forum

Research Funds

Joseph Walder's ramiding diatribe against accepting research funds from the Department of Defense (Enc. December 28, 1982, jc. 1346) deserves some rebuta In particular, I would like to respond to his question, Toors acceptance of financia support from military sources make indi-viduals and institutions dependent client of the Pentagon?' ('he answer is: of course art, unless they want to be.

As an Air Force scientist and research ontract manager. I can state rategorical that we pair no pressure upon our contac tors to ficcome our 'chents.' Indeed, we catition them not to locume too dependent upon An Force funds for continue hunding of research projects, due to year to-year changes in programs of interest the Air Force and availability of funds. The only 'control' that we exert over 100 tractions is their voluntary agreement to perform the work that they have unitare ally proposed to do by submitting an us-solicited proposal to us. These proposal are reviewed in-house, and funding is de-termined purely on relevance, availability of funds, and our estimate of the quality of the proposed research (investigators, facilities, etc.).

Thus, funding of a research project b the Air Force, at least in nonsensi eas, is more volatile and has only slightly more stringent requirements (e.g., we us ally require one scientific report or journal paper per year) than does funding b the National Science Foundation. This figedly makes our courtractors our 'dients which I am some can be attested to by the many lipsi-rate research scientists who have been funded by its over the years.

> Air Force Grophysics Laborate Sumspot, New Mexico 88349

Another AGU Index

I note that Juan 15. Roederer has proosed an imdex of ALTU allillation name GR (Eas. Detalier 19, 1982, p. 817). Acording to this index. Alaska is the mon-AGH-involved state in the Duion. I prais his customary mediesty in disclaining any connection between his initials and the name of the index. I think it only filling that the index be applied on a worldwi basis since AGII in many ways transiend trational boundaries, as indeed its subject nauer does.

l propose that the worldwhile index, ap plied to carlt country as the JGR index is applied to the states, should be named a er either a well-known magnetic index o the Atmosphrik Exidorer spacecraft, ic I should be known as the AE index. I, of conse, emulate Dr. Roederer in disclaim

lug any connection with my initials. A four mound this part of the world with the AE itulex shows that bracking an imlex of 10 compared with 2 x 10° for Egypt and even smaller values for ode er rountries in the region. India has approximately the same untitler of AGU members as Israel with a population me than two orders of magnitude greater. Plus, h appears that Israel is the most ALIII-oriented country in Asla.

> Aliaron Eviatar Tel Aviv University Tel Aviv, Israel

Education Bill Passes

On March 2 the U.S. House of Represe tives passed a bill authorizing \$425 million. for science and mathematics education in col 1984; the authorization is \$350 million more than President Ronald Reagan requel ed in his budget proposal (Eas, Februar) 15

H.R. 1310 allocales \$295 million to the P partment of Education not only to improve precollege instruction in science and mails but to beel up foreign language training to ald in Improving International communication among scientists. The bill also alloss in million to the National Science Foundation for a various of for a veriety of programs, the lion's shart which aims to upgrade research equipment colleges and universities. It is hoped that is dustry will match the \$100 million targeted

for this program. Although the Senate has yet to draw up compatitun bill, hearings were held by the Education, Arts, and Humanlties subcomb sources committee on March 8 and 9 on the the Education Security Act and related strength on march 8 and 9 on the Education Security Act and related strength on the Education Security Act and related strength on the Education Security Act and related strength on the Education Security Act and Telephone Security Act and Telephone Security Secur

Introduction to Tides: The Tides of the Waters of New England and New York

A. C. Redfield, Marine Science International, Woods Hole, Mass., 108 pp., 1980.

Reviewed by Malcolm J. Bowman

This interesting little book is not really about what its main title suggests, an introductory text on tides for oceanography stu-dents. Its subtitle gives more of a clue to its contents and intended readership. The author immediately points out in the preface that this book is written for the many intelligent people who work or play along the coast between Sandy Hook and the Bay of Fundy.'

In addition to discussing elementary tidal theory, the book elescribes in some detail the author's systematic analysis of coastal tides and currents in the New England and New York region. His analysis fits the solution of the telegrapher's equation to Tide Table pre-dictions of tidal elevations and times of high water and slack current. In this way, Redfield separates the observed M2 tides in various straits, embayments, hydraulic channels, and estuaries into damped, progressive waves travelling in opposite directions. These waves arise through reflection of the primary wave at the head of an embayment or estuary, or through two primary waves entering a tidal strait or hydraulic channel from both ends.

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Cover. Roll clouds spell touble; they are often on the leading edge of heavy thurnderstorms that can produce hail, high winds, and heavy rain. The clouds, such as those over Miles City, Mont., pictured on the cover, are but one of the many phenomena portending geographically limited but severe stormscale weather. A call for action has been issued for a National STORM (Stormscale Operational and Research Metcocology) Program to enable meteorologists to observe and pre-dict such small-scale weather and to apply the improved predictions to protecting the public, the national economy, and meeting defense requirements. Proponents of the 10-year, \$1-billion program say it could save 5% of the annual \$20 billion lost to severe weather. See related news story, this issue. (Photo courtesy of Phil Roskowaki, National Center for Atmospheric Research/National Science Foundation.)

Using a noniographic method, the technique produces curves of mean idal range and times of high tide and slack water along the waterway for nptimum estimates of the damping and reflection coefficients. These predictions, well known from Kedfield's pioneering use of the method in his series of papers during the 1950's, are quite good for the udal height and interval but not for slack water. This is to be expected, since the equations were originally developed for use in a rectangular uniform channel, and take no account of the effects of weather, overtide generation, the earth's rotation, bathymetry, and

varying cross sections of the waterways stud-

Unfortunately, most of the intended readers will prohably not understand the summary of the dieory as given in chapter 3, nor, therefore, its application; they will have to read the original papers for that. Even then only those familiar with elementary trigonometry and calculus will make much sense of it. (Coastal engineers have made much use of the method and a particularly good discussion is given in A. T. Ippen and D. R. F. Harleman, Tidal dynamics in estuaries, in Estuary and Constline Hydrodynamics, edited by A. T. Ippen, McGraw-Hill, New York, 1966.) Another criticism one could make of the

text is that no mention is made uf the whole realm of numerical tidal modeling. Numerical simulations are now aufficiently easy to apply and accurate to be of major importance in the production of tidal atlases of semi-enclosed seas and navigable waterways. In spite of this, and allowing for the limitations inherent in the fitting of linear, one-dimensional, damped wave theory to coasial tides, the book is immensely readable and will find its way in the bookshelves of mariners, amateur scientists, and oceanographers all along the northeastern seahoard. Professional coastal oceanographers will also find it a quick sunree of meful facts and figures. One ching Alfred Redfield does not dis-

close is the secret of his longevity. How a man had the energy and lucidity to produce such an interesting book as he approached his ninetieth birthday is a source of wonder to me. Perhaps the characteristics cited by the late Bostwick H. Ketchum in his foreword Chis interest in matural phenomena and his curiosity about them have been undiminished by passing years') have had a lot to do with it.

Malcolor J. Boreman is with the Marine Sciences Research Genter, State University of New York at

Igneous Rocks of the **British Isles**

D. S. Sutherland (Ed.), Wiley-Interscience, New York, xv + 645 pp., 1982.

Reviewed by K. L. Curvie

Much of the foundation of petrulogy was laid on the igneous rocks of the British Isles—one need unly recall the Tertiary igneous rocks of northern Scotland, However, die

relations between various occurrences of these igneous rocks (and in some cases even their locations) have remained obscure inr many of us familiar with the British Isles only through the voluminous literature. This weighty and densely written tome will serve os a most useful guide and reference for all those interested in British igneous rocks. The voluing specifically aims to continue that grand classic of observational geology, Aucient Volcagoes of Great Britain by Archibald Geikie. It does not achieve quite that level but will surely remain an indispensable general reference for many years if only because of its ex-

Applicants should submit a letter of application, a statement of research interests, transcripts, vita, and arrange to have five letters of recommendation sent

Dr. E. G. Lidiak, Ghairmun, Department of Geology and Planciary Science, University of Phusburgh, Plusburgh, PA 15260.
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ice to: Research and Data Systems, Inc. 10300 Greenbelt Road, Sulte 208 Lanham, Maryland 20706 Telephone: (301] 390-6100.

Chairman—Department of Geological Sciences, Wright State University. The Department of Geological Sciences, Invites applications for the position of chairman, to be appointed September 1984. We seek a dynamic individual with administrative talent and an appreciation for research and practice-reinted educational activities. Rank is at the full professor level and no restrictions have been placed on areas of specialization. The department is active with

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The volume includes contributions by 37

oauthors divided into seven parts and three

appendices. The rocks have been divided ac-

cording to age and type, namely the Precam-

brian, Lower Paleozoic volcanic rocks, Cale-

dunian intrusive rocks, Devonian and Car-

boniferuus volcanism, Hercynian incrusive roeks, Late Paleozoic and Mesozoic igneous

activity, and the 8ritish Tertiary province:

petrographic, chemical, and isotopic details

are relegated to three appendices. Each part is further broken down into a general intro-

duction followed by several articles on partic-

The usefulness of reference books of this

kind depends on the quality of the introduc-

tory chapters and on the completeness of the

high. The indices are exceptionally good, and

placing the later material in context, although

indices. In both respects this volume rates

the introductory chapters do a good job at

was rather overwhelmed by the prinfusion

readily sit down and get an overall picture of the igneous history of the British Isles from this book. In the first place diere are certain

difficulties of organization, perhaps inevita-

ble. Only peripherally and in passing is it not-

ed that the part on Devonian and Carbonifer-

with, and possibly comagniatic with, Caledonian and Hercyman immusives. The quality of

ous volcanism treats rocks contemporary

the writing varies from pedestrian to ex-

tremely deuse. I found it heavy going be-

cause of the wealth of references and the at

tempt to get the manimum number of facts

A wealth of small locality mans greatly aid

the visualization. Occasionally these maps

dicir quality is excellent.

into the minimum amount of space. Still, the

facts are there if the reader will dig for them.

cannot be easily referred to larger scale maps,

but in general the thierarchical organization

is good. The number of photos is limited, but

The various articles treat mainly of descrip-

tive aspects of the rocks with sketches and lo-

calities. Some authors treat bulk chemical

data by presenting various diagrams, but

there is little treatment of mineral chemistry

or of specialized chemical data such as rare

earths, although such details can in general

be traced in the very extensive liblingraphy

and superficial. Some sections are quite re-

where Mull and Arrant are treated in three

successive articles. The distribution of space

may seem sumewhat idiosyncratic also. The

Terriary rocks receive the most space, 183

pages, which is not unreasonable, but \$4

pages for the relebrated Hercynian granite

of Cornwall, when compared with 48 mages

for lower Palcozoic rolcanism, seems some

what unbalanced. The selection of data for

the appendires exhibits some peculiarities.

The appendix on petrography starts off with a modest encomitm to the Streckeisen classi-

fication and then reverts to stick terminologic

cal monstrosities as 'marscoite,' 'tregelvaolte

and 'rockallite.' According to the chemical

data, troce element analyses are rare or ab-

sent for the Tertlary province and fur the

Despite these reservations, the book dearly

succeeds in its object of giving condensed de-scriptions of the significant localities of igne-ous rocks in the British Isles. The question

remains whether there is a clientele for such

o large, expensive, and specialized book. It

cannot be read for sheer pleasure, rinlike its

distinguished predecessor, Ancient Volcanoes of

Great Britain. The quantity and level of infor-

mation are insufficient for specialists wishing

field or in the literature, although it will un-

to study a particular complex either in the

Caledonian Intrusives.

for Carboniferous-Permian volcanism and 88

Trestment of petrological problems is sketchy

itive, particularly the one on the Tertiary,

of place names. This generally laudatory comment does not imply that anyone can

ular occurrences or aspects of the igneous

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doubtedly be of great use as a guide and entry to the literature. The obvious place for this book is therefore on the reference shelf of libraries, where it will doubtless remain the standard work on the subject for many years. Few individuals will be interested in this book for their private library.

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EOE/MFH

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Announcements

Ocean Data Presented

A large portion of the unpublished marine geological and geophysical data gathered in 1982 in the Aleutian-Bering Sea and the southwestern Pacific by the U.S. Geological Survey (USGS) research vessel RV S. P. Lee will be made available at a nne-day 'show-u-tell' at the USGS in Menlo Park, Calif., 101 April 5, 1983. The clain was collected as nare of the Circum-Pacific Project, a cooperative effort involving about 25 countries that began last May. The project includes anidies of active volcanoes along the Pacific 'ring of fire' and exploration for new oil, gas, and mineral

Among the data to be displayed is that gathered from petroleum prospective areas near Tonga, Vanuatu (New Hebrides), and die Solomon tslands.

Michel T. Halboury, chairman of the Cir-cum-Pacific Council for Energy and Mineral Resources, will open the symposium with a keynote address on the national importance of scientific investigations of the Circum-Pacific rin. His address will be followed by a series of brief papers describing the purpose and nature of the work being exhibited, and some of the more important initial results.

Although no registration is required, those

interested in attending should call Florence L. Wong (telephone: 415-856-7042) at the USGS in Menlo Park, Calif. General informaAhoy! Sall Back into Baltimore

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The 'show-n-tell,' the first of several syntposia and workshops to be sponsored by the ciation of Petroleum Geologists (AAPG), also is sponsored by the Pacific marine geology branch of the USGS.

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arly irenching and the dating of offset geologic units One of the goals of the Third Ewing Symposium reported in this volume was to obtain an overview of large earthquakes of several countries. Ceae histories of recent major events in China, Japan, Mexico, the U.S.A. ara included Renewed optimism about earthquake prediction generated of the symposium is

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this Absorption and scenaring of radiarion (pretirice or vevos)

THE ABRONSHIE EISSOCIATION OF MATER VAPOUR BY SOLAR HI LIMAN & RADIATION

B. A. Serin, I. M. Verdevne and J. H. Carver (Secorch School of Phynical Sciences, The Australian National University Comberns, ACT, 2600, Auntralian National University Comberns, ACT, 2600, Auntralian Properties cannot section of scientiar alyon as where manured an a function of temperature on the A.1 A interval motives [21] and 1119 A. Over the which of the noise Lymas of lies there is no fine structure apparent in the cronn nections which were accounted with R.RS A resolution. A large wastened and the apparent in the cronn nections which were accounted with R.RS A resolution. A large wastering the noise the molecular system rections of water vapour. The materials for the control of the rate of phacodimeriation of water vapour. The materials for the selection of the temperature and wavelangth dependence. It is found that the phacodimeriation of manufacture of hoth the temperature and wavelangth dependence. It is found that the phacodimeriation by uning science of hoth the phacodimeriation by uning science are system and common to doutness the discretation or responding to fined temperature may 200 K. Analytical models for rhome crore sections are presented for use in phorechesical calcalarians. (Photoabeerption, photodimeriation J. Geophys. Ens., Elve, Press 140258

Tales). J. Gaophys. Ens., Elua, Paper 340258

Onio Absorption and scattering of radiation (CO. RADIATIVE PARAMETERIZATION USED IN CLIKATE HODELS: COMPARISON WITH MARROW BAND HORELS AND WITH LABORATORS DATA CONDARSON WITH MARROY ENG MORELS AND WITH LABORATORS BATA

I. T. A light insteam Conter for Atmospheric Research, Boulder, Colorede 50307) and V. Remanethan

Absorptiones for the 15 us band system of Cq ere calculated from throm models; the Coody model, the Malkaus model and a side dend fersulation. The side bird formulation used in this study applicative consumers for her and loctopic heads of CQ. Comparises is made between these celculated sheerptoness and measured observationen. The hand models are in good ogerement with the communed descriptiones. The sensitivity of these models to increased CQ, is investigated by interconsumed the information of the sensitivity of these models. It is concluded that little difference seinth between the server band and wide hand sheeptances models, provided the wide hand sodels account explicitly for the vertous hat and lactopic bands of CQ, we show that alignificant errors result if the Goody or Malkaus model is applied to spectral intervals larger than sodel is applied to resorted intervals larger than solid, and in the color of the vertous hat and lactopic bands of CQ, we show that if applied to resorted intervals larger than solid, and provided the vertous hat and lactopic bands of CQ, we show that if applied to results suppose that cliests condens spectral resolution 10 cm⁻¹) explored with coverner over lim CQ, fluxed and betting ruten; larger than loss is region, The kQ continuum chapellow in the latter significantly the vertical destriction of colored that it is region alters significantly the vertical destriction of colored that it is region alters significantly the vertical destriction of colored the colored that it is region alters in interval to replace the colored that it is region alters significantly the vertical destriction of colored that it is region alters and its latter troposphere.

9470 Compositioe SOLAR HE SOSPHERE EXPLORER: SCIENTIFIC OBJECTIVEN AND RESMANCE ALSULS

C.A. Barth [Leboratory for Absospheric and Space
Physics and Department of Asiro-Beophysics, University
of Colorado, Beulder, CO 80309] O.Y. Rusch, H.J.
Thosas, O.H. Hount, B.J. Rottman, G.E. Thomas, R.W.
Sanders and S.M. Lawrenco.

Instruments on the Solar Mesosphere Explorar

aimeltaneously measure osona dessity, temperature, and solar eltraviate; flax. Passits from six omnins of observations show that osona density in the mesosphere changes from day-to-day and with the seasons and fint the principal cases of these changes is the variation is etmospheric temperature. The dependence between onone density and temperature is inverse, with a decraose in temperature producing an increase in osona density. This dependence is observed in the seasonal patients and also in orbit-to-orbit observations dering dramatic otmosphere changes sech as stratospheric warmings.

Geophys. Res. Lutt., Paper 3L0322

0430 Compesition
020KE DERSITY DISTRIBUTION IN THE MESOSPHERE 150-90
KMJ MEASURER BY THE SME LIMB SCARNING NEAR INFRARED
SPECIROMETER
H.J. Thomes Ilaboratery for Atmospheric and Spaca
Physics and Department of Astro-Geophysics, University
of Colorado, Boulder, CO 603191 C.A. Darth, 6.J.
Rotiman, R.W. Resch, G.H. Muunt, G.M. Insuence, F.W.
Sanders, G.E Thomas and L.E. Clamens.
The oseno densition between 50 and 90 km are dedecad
from 1.27 µm airglow measured on the Solar Mesosphere
Explorer setalite. The derivad dansition agree wail
with those eade simultansously from SM by the
el travialet apoctrometer. The data set antends from
pole to pole nt about 3 µm, for most smill letitades. At low altitades, in the metosphere, there are
larger verictions to stone deseity in the winter latitades then in the semmer. Above the meso-passe the
day-to-day veriction in ozona density is a factor of
two at omst latitades and timus. Deophys. Ses. Lorr., Paper 3L0301

0430 Composition
MESOPSHERIC 020ME DEPLETION DURING THE SOLAR PROTON
EVENT OF JULY 13, 1082 PART I MEASUREMENT
R.J. Thomas Libboretory for Atmospheric and Space
Physics and Department of Atmospheric and Space
Physics and Department of Atmospheric and Space
Physics and Department of Atmospheric and Space
Physics and Development of Atmospheric Reviews
Rottmae, D.W. Naech, O.H. Moant, R.M. Layrence, R.N.
Sandors, G.E. Thomas, and L.E. Clemens.
Yho eaer infrared apportrometer and the altreviolet
spectrometer on the Solar Manapahare Explorer ISME]
observed the secret density as e function of latitude
and altitude dering the solar protoe event of Jely 13,
1982. Airglow nt 1.27 µm was observed at the earth's
imb. The attitude profilms of the emission were
inverted providing nonce densities. The otono
densities observed showed a clear decrease dering the
avect. The maximum depiction seen was 70%. The
decrease was observed in the sorthare high latitudes
at masospheric olditades. The decrease was vary short
lived, lesting less than a day.
Osophye. Res. Lerr., Paper 310325 Camphye, Ras, Larr., Paper 310325

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3 the day(the poler thermospheric dennity of steals at trogso, shows 200 km, to secone of 10'cm-1. (csep, rberanphare, stoals nitroges abundance) Gaophys. Res. Lort., Paper 310299

0430 Composition (aromic or molecular)
TEMPERATURE MEASUREMENTS IS THE EARTH'S STRATOSPHERI
USING A LUB SCAUNION VIBIGLE LIGHT SPECTRONETER
D.W. Reach Laboratory for Assospheric and Space
Physics, University of Colerado, Boulder, CD BOSSEI,
D.H. Hounty J.M. Zawadny, C.A. Sarth, R.J. Retbann,
G.J. Thomas, R.E. Thomas, R.N. Bandars, and R.M.

Lawrence.

The temperature of the warth's etasphare hotseen 4 and 80 Ms is inferred from measurement of Maylaigh scatterad sunlight by a visible-light spectrometer on the Solar Metosphore Explorer spacecentrit. The MMS deviction of the satellite measurements from conventional rocket measurements in DTK above 40 km and 2-37 below 40 km. The vabulite date are compared to model temperatures for March, 1982. Geophys. See. Lett., Paper 3L0409

Ocophys. See. Lett., Paper 310409

0430 domponition (atomir or mulachar).
COMPARISON OF MESOSPHERIC OZORE ADMONANCES MEASURED BY
THE SOLAN MESOSPHERIC OZORE ADMONANCES MEASURED BY
THE SOLAN MESOSPHERIC OZORE ADMONANCES MEASURED
S. Solomon, Laboratory Laboratory, MCAAVILL, Soulder,
Colorado 803031. 0, M. Bresh, R.J. Thomas, R.S.
Ectuan, Ilaboratory for Atmosaheric and Space Physics,
University of Colorado, Bouldar, CD 803091.

Otosa obcarvations in the mesosphere obtained by the
near infrared and ultravirlet spectrometern omboried
tha Solar Mesosphere Espiorer (SME) satellite are
compaind to two dimeasiral model calculations for the
mesth of January. Is general, the model calculated
abundances an assemblat smaller than those Mesoamend,
but sahibit similar trends with impact to altitude
and latitude. The possible causes of discrepancies
include the mesospheric No coetant and photochemical
reaction rates, particularly the mite of Og
photolysis.

0430 Composition Integlic of molecular!
NESOSPHEPIC OZOME PEPLETION DUPING THE SOLAR PROTON
EVENT OF JULY 13, 1982 PART II. COMPARISON BETWEEN
1HERPY AND MEASURMENTS

EVENT OF JULY 13, 1982 PART II. COMPARISON BETWEEN INTERPY AND MEASURMENTS

S. Solomos, Laronomy Laboratory, NOAA/EPt, Bouldar, Colorado, 803031, G.C. Reld. O.M. Puach, P.J. Thomas, Ithboratory for Atmospheric and Space Physics, University of Colorado, Boulder, Colorado 803091. The tolar proton avent of Jely 11, 1982 was the largest to date in the cerroni noier cycle. Proton These observed by the NOAA-5 astellite have been used to calcalate ionization raten daring the ovent, which have been feand to be alonsi es large as those of the Augent, 1972 aven neer 79 km, but such seallar at lower sitisedos. This ionisotion leads to the production of odd hydrogen radicals (H-RH-HO₂) which catalytically destroy odd oxygen in the museSphere and atratosphere. A one-Dimensional time-dapandent model has been esod to calcellate the percentage chenge is osone resalling from this ewest. The raicelated canne depletice is compared to the tobserved by the Solar "Annalist Capitality, Paper 310396.

Gasplya. Res. Lett., Paper 310396

0430 Composition

MEASURMENTS OF Mg. IN INE EARTH'S STRATOSPHERE USING

A LIMB SCANNING VISIBLE HIGHT SPECTRONETEN

O.H. Moent Haboratory for Atmospheric and Space
Physics and Repartment of Astro-Geophysics, University
of Colorado, Boeider, CO 803091 O.V. Susch, John.
Zawodny, C.A. Barth, G.J. Rottman, R.J. Thomas, E.E.
Yhomas, R.W. Sendars, B.M. Lawresce, J.F. Nosom
JAeronamy Laboratory, MOAJFERL),
NO, dansities determined from the 1mb scanning
visible light apoclromeier on beard the Soler
Nasosphere Explorer spacecraft are reported for winter
1981/82 in the altitude region 28-40 km. The
observational technique attilise the photoabsorption
by NO, of Rayleigh scattered samight in the 440mm
apscfrair ragion. The ND, density veries from pole te
pole and show large verietions at high northern
latitudes daring the winter months which are milited
to both the temporatern and flow of air near 30 km.
Geophys. Res. Lerr., Paper 310328

0460 Ildes, waves end winde POKES PLAT HSI RABAR MEASUREMENT OF WINDS AND WIND PORES FLAT HSI RADAR MEASURSPERM OF WINDS AND WIND VARIABILITY IN THE MESOSPHERE, STRAYOSPHERE AND TRAPOSPHERE (Nerlogal Ossooic 5 strayespherir Adqis, Aeronomy leborasory, Sculdes, CO 80303) The capabilisy of the HST rachulque for ocception winds and wind vasiability in the massaphere, attraction whose and Vind Vasiabitity in the massephere, attracesphese and stoposphera to demonstrated using recent
ressire obtained from the MST sader or Foker flat,
Alatha. Nescapheris results include mana flow, tidal
motions and shorter resultinctuations. Strescapherisresponspheria regular include, in addition, highfrequency (>15) wave-like Cluatuarions observed in
the vertiral wind tield.
Red. Sal., Paper 180378

Physics of the Solid Earth

Volume 18, Number 5 Аравович З. И., Ярошевич М. И. Вопросы етандартнасции честотных харак-терпетии динивопериодных сайснографов типа С.

Лисиции Е. Д., Венодворов Н. И. Неуотановившееся поле электрического и мегаптного динолей в двухслойной среде с пеироводищим перхимы словы Захвров Е. В., Песмениова Н. И. Чеслениов пселодопанию влияния радиально

ротаже

псоднородной зовы провижнования на розультеты эпектрометилиного ке-

Вердичовений М. Н., Беврук И. А., Вальян Л. Л., Волков Ю. М., Дывтриен В. И., Жданов М. С. Vt Всесоюзная имоло-семинар по геозпектрическим иссле-

Strakhov V. N. Goldshmidt V. I., Kalinine T. B., Starostenko V. I. invorsion of gravity and magnetic enomalios: the prosont stole and further developments of the theory in the USSR.

Gonshaft Yu. S., Esttaruv M. M., Milutin S. A. Magnelle behavior and composition of the forcomagnetic phases of basalia recrystallized at high temperatures entiatmospheric pressure. Kisaley A. P., Frolova K. N. A transvorso wave from a noodirectional source in

atmospheric pressure

Shoherhakov V. P. The role of kinetics in the exidetion of titsnemagnetite grains

Bazhenov M. L. The application of the regression analysis to paleomognetic studies

Systov B. S., Ebimelevich M. I. Determining linear relations butween the compo-

SOLENTIFIC COMMUNICATIONS

Zhdanov V. V., Kharohenko V. A. A physical modal for motamorphic-motasomatic systeme
Spirtue V. B. Determining first errivele of converted inultiples from distant earthquake records

Panaseuko G. D. Long-period varietions in the intensity of microselama at the Apelity station

Aranevieb Z. I., Yarosbaviob M. I. On the stantisrtization of frequency responses of long-period type-C selamographs

Lisitzyn E. D., Zanadvorov N. P. Trunsiant fields from electric and magnetic dipoles in a two-isyered earth including a nonconducting upper layer

Zakherov E. V., Nesmeyanova N. i. The effects of radially inhomogeneous penolration zone on electromagnetic log data—a numerical study

OHRONICLE

Berdichevsky M. N., Berruk I. A., Vanyan L. L., Volkov Yu. M., Dmitriyev V. I., Zhdanov M. S. The 6th All-Union Symposium on geoslectricsi methods

sciences from precollege through graduate programs, including career guidance, acadenic preparation, student recruitment, and

manpower supply and demanel.

At the meeting a draft of the AGU-sponsored Garees in Oceanography booklet by contmittee chairman G. Hallister was thoroughly discussed and a new draft will emerge soon for final approval. The booklet is designed to complement the Career in Geophysics booklet recently published by AGU; the booklets contain Information about planning a career, job

AGU Panel Meets opportunitles, educational requirements, and o synopsis of where the prospective student On Career Topics might apply.

Among other topics discussed were the fol-

Graduote students and their career opporlowising items: (1) AGU-sponsored lectureahips for graduate student recruiting in oceanogratunities in ocean and earth sciences were the focus of the Education and Human Rewith no volunteers and no money for sources (E & HR) Comminee meeting held nt the 1982 AGU Fall Meeting in San Francisco. A manding committee of AGU, the E & HR such lectureships, the booklet and individual efforts will have to suffice as recruiting devices; (2) AGU women's sessions sponsored by this committee will drop special reference committee is responsible for matters concerning education in earth, ocean, and planetary to women, but the panel at the 1983 AGU Spring Meeting (Louise Levien, choir) will Spring Meeting (Louise Levieti, Class) will compare the odvantages and drawbacks of careers in academia, industry, government or consulting! (3) the E & HR Committee will be developing a membership-wide questionnaire to order to improve and perhaps increase the

committee's service to AGU. committee's service to AGU.

The new edition of Geophysics—The Borth in Space, AGU's careor booklet for high school students, is now ovailable. The material has been updated and the format changed and expended by use of pictures. the addition to the revision of this booklet, AGU has within

the last year produced Careers in Geophysics, which is aimed ot undergraduate and graduate-level college students, and the above-mentioned draft of an additional booklet on careers in oceanography. Individual copies of both Geophysics—The Earth in Space and Go-reers in Geophysics are available free of charge to students. In addition, larger supplies ore evailable to professors ond guidance counselors for their students upon specific request.

At the Fall Meeting our continuitee also sponsored a panel discussion (chaired by C. Sancelta) on 'Doubts and Discouragements: Beginning a Career. About 50 people attended and a report of the ression may be found in the Editorial section of this issue of Eas. Charles Hollister

Woods Hole Oceanographic Institution Chairman, AGU Education ond

Human Resources Committee

Report to IUGG

· approximately 1400 lotal pages n edited by David Jemea

Psyment must be received before service begina

Electromagnetics

OTO SINCTOMARPHIO THEOTY
WAVE PROPAGATION OF A STRIP GRAVING OVER AN
INFEDRACE PLAYE, SCLUTION BY REDICTION TO A
MODIFIER RICHARD-HILBERT PROBLES
A.M. Barboan (Castor de Amilie e Procasemmento
de Sinain, Cospieno Interdisciplinar, Instituto
Superior Técnico, A. Rovieno Prie, 1096 Lisboa
Codes, Portugal), S.P. Son Sonton and J.Figandec
The TW electromagnatic were propagation elong
actrip gracing above an impudence plane is
studied. The problem in formulated in terms of a
modified Himmers-Hilbert problem. The model
equation of the atractawe in decired and colved
numerically. Surface waves and lady wave under
are identifind. Please we locally wave modes are
pressoled and their Supendance no frequency and
promatified pressured in discusses. The
possibility of copilination of this atracture to
the deaf go of a insby-wave amount in suggested,
(atrip granting, electromagnetia wave propagation,
leaky waves, Rieamn-Hilbert problem).
Rad. Scd., Papar 180407

Rad. Sed., Paper 180407

OTTO Radio Oceanography
FRANKITSKC DEDERDENCE OF OCEAN NAVI-RADAR MODILATION
TRANSFER FUNCTIONS

N. J. Plant Environmental Guisece Division, eaval
Research Laboratory, Washington, DC forts), W. S.
Feliar and A. Crose
During the Marine Remote Benefic separates of 1978
HANJEY 701, we suployed sicrosave techniques at Xand L-Band to determine the dependence of ocean-wave
radar sociastion transfer Yunctions (METRI on various
radar sociastion transfer Yunctions (METRI on various
radar sociastion transfer Yunctions (METRI on various
radar sociastion transfer Yunctions (METRI on contante of these permentees. To addition to confirming many of the properties of the bocksettened
microsave adjust and show that they both depend on
several of these permentees. To addition to confirming many of the properties of transfer functions
reported by previous anthors, this work indicates
that MTFs decreases with increasing supla between
vave propagation and antenne-look directions but
eve sensatially independent of small changes in airsee temperature difference. Coherents functions are
such smaller whan the entonnes are pointed parpandicular to long wares, however, X-band transfer
Yucctions measured with hortisonially polariend showwave radiation are found to have larger sampitudes
than these obtained using your dependency functions, however depend atronsfer
Coherence Yunctions, however depend atronsfy
dependence implies that in addition to be lang
subdicted by long waves, short waves amplitudes
fluctuate to response to environmental factors
unrelated to long waves. Spectral densities
of sheet fluctuations induced by long waves.
J. Geophys. Eas., Green, Paper 30002

D71 Fracts Sunsing
APALISIS OF CORPOSITEFO LANGEAT, SEASAT AND SIGNA
FMACES OF VAPIETY TERMAN TYPES
Ph. Robil lard and O. Evane | Fer Propulsion University,
all formic institute of Technology, 85 181-701, 4800
Out Grown Dr., Paradom, CA Willog;
Nutlessace | bare data (SIP-A, Besset EAS and landear
ASSI over areas to northern Algeria and weatern Utah
have been correlatered in order to assers the completendary offices of the orbical sensors for geologic rapping in two wery different terrains. This First statept
as registering such a data set whose that the radar
bate exter informite provided by the SIR-A lange interes the Cassification accuracy of several geologic
units over the landest lange sione, and over combined
indust, Sich, Leff., Esper 110303

Exploration Geophysics

OPIO Computer applications
MIRESCAL AMAITSES OF THE 43-DEGREE VISITS-BIFFESSACE
EQUATION FOR HIGHATION
Beary draw (feladyna Exploration Co., P.S. Box 30269,
Manatan, VI 1/011;
Migration is now most commonly performed by manns of
finits-difference columination of the wave equation in
the space-lime domain laithough alternative approaches
such as f-X, Mirehhoff, Violum-difference in the
space-frequency domain save atroog adherence).
Clarbout's derivation of the 13-dagrae paraxial ray
equation and its iteration to the 43-dagrae squation
are well documented. On the other hand, the
transcription of the differential squation to a Vinitadifference scheme has accreted with practical computing

Physics of the Solid Earth

Volume 18, Number 6 The 90th anniverency of O. Yu. Schmidt . . . The 90th anniversary of O. Yu. Schmidt
Saironov V. S. The thacry of the Earth's origin — the state of the ort
Levin B. Yu. The cosmological significance of asteroide, comete end meteoritic
matter in the Solar system
Ruckof E. L. Tha origin of planet satellitea
Vityazev A. V. Fractionation of metter during the formation and evolution of
the Borth the Boyth
Kuckov O. L., Khiterov N. I. Geochemical espects of the early evolution of the Eorth
Luhlmovn E. A., Mayova S. V. Models of the thermal evolution of the Earth
Monin A. S. On the circulation of etmosphere and occon

Atmospheric and Oceanic Physics Volume 18, Number 9

Osloshev V. E. Acquatic Rainth Inclined Sounding of the Atmosphere Gorehakovo I. A., Felgelson E. M. On the Composehility of Calculated and Measured Fluxes of Thormal Radintion
Ginsburg A. S. Equilibrium Temperatures of Sofertively Absorbing Planeta
Lythoviseva Yu. S., Yaokovich L. G. Aerosul Absorption within the Wave Length Lythev Seva Yu. S., Yaskovich L. G. Asrosul Absorption within the Wave Longin Interval 0.25—0.8 µm

Zhulonev Yu. V., Nevsky I. A., Petrynnev I. V. A Study of the Parameters of Marine Submiterone Asrosuls and Their Role in the Alanospheric Processes

Eleasky N. F., Terekhing Yn. L. Applications of Regularization Methods to Restoration of Vertical Ozone Profile by Observation of the Unakohy Effect

Yeher V. L. On Spece Fluctuations of Uniforwater Illumination

Mirdle Zuev V. E., Kyckov G. M., Visibility of Rometo Objects in Scattering Middle Zakiarov V. B., Zaslovsky M. M. Klatelic Equation and Kolmogorov's Spectra in Scattering a Work Turbulence Theory of Wind Woves Zavelzhensky M. V. Vortex Flows in a Fluid Layer Makarov S. A., Chookechkin Yu. D. Coupled Internal Waves in Viscid Incompressible Pluid

Kernyek Y. V. A Noie on Bereclinic Instability of Almosphere Gordickey G. I., Siderov V. N., Sylefdenkov M. A. On Condensational Activity of Restratory G. N., Krosneya T. M. On the Accuracy of the Actinemotrical Sounding of the Atmosphere Semency E. V., Taran B. M. Namerical Modelling of the fee Drift with Accounding of Formatium of Very, Close Pack ice Zones

CRITICS AND BIBLIOURAPRY Khrgian A, Kh. Book Roviow: Karo P B. P. sAcadomician B. B. Golltsyn oud

experience and is only mentioned piecement inhes at all) le the literature. The full opposition in reviewed here, as used to a typical production cude. A numerical stability analysis of the wos Sausonn type is applied to the complete ficite-difference squarioo. It process that the complete ficite-difference squarioo. It process that the complete solitical seable, at least for the values of the complete local persentars in morest use (the smelting to the talues of these persenters is illicotrated.) Thus, any perceited consistence of migrated seations runned be bland on competational staciston. The shortcookings are entirely caused by de Viciencina in the analytim freeworth and the medsing.

GEOFETRIDE, Vol. AB, NO. 5

OSIO Computer applications
EMETALL FILTERING WIRE THE ENCORD MOMENT MORE
See 0730 Salemic methods
L. S. Lines (Amone freduction Company, F.O. See 591,
Tules, OK 741029 S. Treitel
The Senhum-Oilbert leveres sathod relates model
estimates to estual earth models by use of a resolting
hermal. This leversion may in turn be related to
verious digital filter designs. If the encond mement
tors is used to define the recolling hermal, two typns
of Eliars are produced by as eigenvector decomposition
of a time-weighted autocortainto matriz. The
eigenvector corresponding to the larguet algevene of
this matrix is similar to the output goarsy filter,
while the eigenvector for the smellest eigenvalue
performs anne line a denomajution filter. Synchnic
and real data recognize demonstrate the obstance-incide
and real data recognize demonstrate the obstance-incide
ef these filters and compare them to the feed list square
eous filters and compare them to the feed list square
eous filters offer me significant advantages
ever their Evolidees more relatives.

GEOPSTRICS, VOL. 46, NO. 5

0930 Selamic methode
VERYICLL SEISMID PROFILIEG: SEPARATIOP OF SPOUSO AND
DOMBOUS ACCUSTIG WAYES IS A EYRAPIFIED RECUM
S. Sesses istudes at Productions, Soblembergar: A Sue
de le Cares, 921AB Sismer, Francei t. Norcelos
One of the assessical staps in the procasalog of e
rerisal selamic profile is the separation of upgoing
and developing signats. With this gratepactize is sink,
selamic data resorded in a borebole arm modeled in
teves of these wates and a mathematically optimal
'least-agances' techelous for extracting these is
farired. The method imposes practically no constraints
on the spacing between tenording lavels and alloss
element perfect rejection of a coherent downgoing
signal.

The resor forcestatice of the ons-dimensional model
requires that stougile impedance information be
included, for a researche and resilatic approximation
can magicat impedance. We derive frequency-watenumber
response plots for the two limiting cases of each and
randely speed levels and rosper these to the tempon
of a "convectional" vefocity flirating rechnique. By a
cercula study of weistable logs, recording lavels can
be chosen to optimize geophose coupling rather than
instance and if one special amplitude recovery (TAS) ere
required prior to application of the seconique. The YAR
andrestelou can be computed from each eligate, which
amphasises the possibility of more complete ayourgless
tectors.

8910 Seisele methods
881381C GERARCTESISTICS OF A PREGARRIAM PLUTOE ASE ITS
ADMACTS BOCKS
5. Sejnat l'Ospartment of Osciogical Scinoses,
University of Sashatchevan, Sashatchevan,
Canada 87% 8000 S. S. Seculiar, S. d. Zing, F. y.
Wallir, M. P. Wang, and t. S. A. Jones
Burlace, boresola, and laboratory succession,
measurements all coefirs the saletance of a
near-surface low-velocity some in metavoltanic,
measurements all coefirs the saletance of a
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near-surface low-velocity some in metavoltanic,
measurements of page fractures and extende from the
aurface to depths of between 5 and At m, sithough
accasional oppo Yrectures estend to at least 80 m.
There is a linear detraces in somic velocity with
increasing frequency of large Ytectures; the details,
however, vary for different sites, depending upon
saveral gasingle features including roch rype and
monflactore perceity. Luboratory somic data indirate
very low microcrack densities in the volcanic and
plutace crothes.

Systhetic astamograms derived Yrom somic log
information from the senter of the greatite pluton have
has a compared with a measby multifold selemic profits.
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selection of the senter of the sen

0930 Selasic methods
ANDMALOUS Setsmic CHARACTYR-BEBING BMA SHELP
Soger G. Examond issuen Compony, U.S.A., P.O. Sox 4279,
Bouston, 78 77001) John S. Oathor
Selasic dara collected within besins along the nuter
Sering Sea Shelf often exhibit a distinct change in
selastic therastar between 1.8 and 7.8 for two-any time.
This change appears as selasic sactions as a reflector
or as an increase or decrease in amplitude. The lestore
is of regional extent.
This obsegu in solasic choracter is a manifestation
of what has been celled in other besins a bottom
slavisting refisetor 1858). BSSs ero cofinators that
it) are sub-parelies with see floar topography, if) are
discordent with extentigraphy shore the enafloor
distates, and (3) do not demonstrate all the
characteristics of a multiple. Two causes of 658s ero
generally scasped. One involves so ico-line mislute of
water and ges, called "gas hydrate," in shirth gas
moisques. The other cause involves the disgenatic
siteration of biogeole opal-A to opel-OT in
distoraceous sediments.
SESs were preservated at three jocations in the Section

0930 Seissic methods
PREDICTIVE DECONVOLUTION IN SHOT-RECTIVES SPACE PREDICTIVE RECONVOLUTION IN SHOT-RECRIVES AFACE
Larry Netley (Osophysics issearch and Osvelopment,
Arenco, Phabran, Saudi Arabia) Jon Clearbout,
Reandard predictive multiple suppression techniques
in marine reflection selevology usually resort to
medianeless! secoptions about the anderlying serth
which assumes vartical incidence propagation in the
which assumes vartical incidence propagation in the
water layer, yet release common seemptlone of sero
offsat and sero dip. Is perticular, different
end receiver locations.
One of these methads

ortsat and sero dip. In particular, different reflexitities and water depths are assumed at source and receiver locations.

One of these methods, esoficor-consistant multiple aupproaches, nathods, esoficor-consistant multiple approaches, nathods, esoficor-consistant multiple approaches, nathods, satisfat resease as a convolution of me awares itsqueery respondes aits emmedicus abot, log-fraquaccy downlo, this bacdens as aspatable, log-fraquaccy downlo, this bacdens as aspatable, additive makel shick cac be solved by lisser responses at achiques. The amometous amplitudes apposes at a solved for auch frequenty lisser responses at a colved for ach frequenty lisser responses at a colved for ach frequenty lisser responses at activation for apposes of the elgorithm.

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response for say yestiquist trans must be mislinen phase; is sufficed to active and the second state of th

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0930 Seivelt methode
AWTOMATSO ASALYSIS OF MERICE SEFEACTION OATA: A
COMPUTES ALGOSITHM
C. Fetrich Srvin [Gapertment of Geology, Sorthern
Illinois University, Getaib, fl. 60[15] L. O. HcOlnnis,
A. Cotta, and M. L. Sell
A. Cotta, and M. L. Sell Around roll mater with an apparent velocity of we was 25 Mg dominant frequency, and II g appear wavelength. A receiver interval of 5 m and a bid spread langth of A5 m ware used to obtain Reductorerage. Although the nature probing was sent overlapping worker and/or receiver arrays on the surface were not need you the excurding gooding transport.

Attitude University, Sefails, fl. 601191 L. O. McOlomis, A. M. Culs, and M. L. Sall
A computer algorithm is described that authemates the processing of wafractice data anguired by conventional, multichannel, selander reflection profiling, beginning with the detaumination of the Vitat arrival times and anding with a contoured velocity-dopth section. Traces for several tiosely spaced shots are first summed to how operator to concert the lites broad to a possible that can be detacted by the computer. The sligorithm calculates intercept times using running overages of sloques. Supplies to refractors are picted and a velocity-depth profile, interpolated at constant velocity intervals, is printed as a contoured erosa-acetion. A prolile svousing Georges Sank, northwest Atlantic Ocean, is interpreted by both automatic and manual tachniques for computation. order in avoid a increase in recolution count in sensithing effect of overlapping subscrize rather finited, the large-amplitude auface until attenuated by a process called Vibrount bilinks 1940; attounated by a process called Vibrosut shifted 1984.

Vas is based on the application of sherriff amplitude a sting before Vibrosets stilled the supplication of sherriff amplitude a sting before Vibrosets crusacattelets was found to be effort tree for this parameter sealing results in a signal-so-make ratio bysense equal to the gain appared from crosscarrelists. It scaling wholess length and the length of wars as the conting wholese length and the length of wars as the laprovascut for a given swapt-frequency band. A she are ling window and langue swap langth girs less creates breaked improvascut for a given swapt-frequency band. A she are ling window and langue swap langth girs less creates because it has been a first a before girl objected to consecut the constitute of the bighter girl objects for a standard treasure of the quality of Allantic Gostal Rudden clearly showed that VSV processing capital data clearly showed that VSV processing capital possible to map shallow bacament reflections of 12 solfs. Sollections from the sadinous are suffered possible to map shallow bacament reflections also became dies lent.

OPOVEYATER, VIL. AA, H.I. 5

Geodesy and Gravity

LACOUTE AND COMMENCE STATEMENTS.

LACOUTE AND COMMENCE STATEMENT—LINE CHAPTET METER

LOCISE INCLUSION INDUCES and Emphore Cravity Selection.

The Contrast of all Sumburg correlight—line gravity selections are not sumplessed to a shift line movement that is not used to a circle (testoate, 1973). It was declided primarily for shipboord operations to spoke direction of the contrast primarily for shipboord operations of operations and the contrast primarily for shipboord operations of the contrast primarily for shipboord operations and account in a beginning to a ship activities. The straight—line composing is a modification of the contrast primarily for the composition of the contrast primarily for shipboord operations and the contrast primarily for shipboord operations and the contrast primarily for the contrast primarily

thoreby making it unnacessary to sorrest far at a fafets.

The straight-line empowers is a modification of the sero isopte spring empowers in a so definition of the source of the sourc

1993 Geograf or miscellaneous
YIELD TRIALS MITH THE LACOSTE AND ROMBERS STRAIGHTHE
GRAVINITES
H. O. Validant (Satth Physion Branch, Separated with
Sectory, Mines and Genources, 3 Generalisty Gravinity
Octave, Ont., Canada Sia Gyr)

Euring field trate in 1900, the protetys of in
LaCosts and Romberg streight-line gravineter (set
LaCosts and Romberg streight-line gravineter (set
LaCosts and to two temperations we maintained
Si-1) generally produced gravity values intrinsical
Si-5, and S-Al). Correlation easly(se about boar
Anta from SI-1 with on cross-coupling corrections with
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Geomagnetism and

that there is a 93 percent pro

average wate exceeded two per year. This is mose than a factor of 20 greater than the inferred present rate. There is a 50 perment probability that the average rate sacceded sight pac year, more thee a factor of 80 greater than the inferred present rate. The calculated rates of sureral incidence can be used to extinct the action position of the geomegracic pole. In both of the probability examples sited, the pole was located in the Eastern Hemisphere. To the first example it would have been displaced 9 degrees from the geographic pois, and in the second escapis, 17 degrees from the geographic pois. (Paleonspectlam, autors, secolar variation).

Geophys. Res. intt., Paper 18,0365

7560 Time variations, payeomagnation SIGE MEDIEVAL AURORAL INCIDENCE OVER CHIMA AND JAPAN; DPLICATIONS FOR THE MEDIEVAL SITE OF THE GEOMAGNETIC POLE Serge L. Siscom (Department of Acadepharic Sciences, Chiversity of Californis, ine Angeles, 98024), Kenmoth L. Varosub varosuo The catalog of blatorical colemtal surores compiled

The catalog of historical celental surpress compiled by Kainater flate 176 surpress compiled the Kainater flate 186 surpress for Linear in the partial 501 to 1400 Ab. The two listings have no avents is formen. If they are considered as Independent random examples from the sums population, the lack of overlapping events can be used to determine the probabilities of different medieval surprel occurrance frequencies avon the Chine-Ispan quester. Ye Yied that there is a \$\frac{9}{2}\$ portent probability that the eventual random the internal present random work them a factor of 20., This corresponds to a possegnation pole increase in the Tratern Remisphere displaced now then 9 degrees faom the geographic pole. Pricomagnation, surpre, secular variation).

Geophys. Cos. Lett., fapor 32035

Hydrology

yilo drondwater

IMENTIFIEM SOURCES OF GROCHWATER POLITION:

AS CHINARIDES APROACH

E. M. Gorelish [O. S. Geological Survey, Kanin Park,
California, 96(28), S. Evans and I. Resean [Department
of Applied Earth Solences, Estaford University,
Sandord, California, 24705;
Laset apuares regression and linear progressing for
least absolute error setimables are such combined with
groundwater solute transport simulation to identify the
locations and amplitudes of Aquifer pollutant sources.
Follutant sources are identified by matrhing simulated
and measured noneacting calcus concentration data.
We have nesumed known hydraulic parameters but considered concentration data arrors explicitly. The
Identification models are demonstrated and congared
using two hypothetical aquifer systems, one for the
stady-state models are demonstrated and congared
using two hypothetical aquifer systems, one for the
stady-state models Mentilled unknown pipe leak locations and leak cagnitudes based upon sporms and agatically distributed shincide and tritlum data. The
member of likely leak locations was restricted in the
models by asploying mixed-integer progressing and sampwhee multiple regression. Transient models identified
upon concentration Sistorias collected at observation
usils. In this case conservative saluta concentration
data ware abundant and contained substantial errors.
Halmaring sither least absolute or least squared errors
was successful in identifying pollutant sources. Purtharmors, we demonstrate servor analysis for the results
state Resour. Res., Paper 100406

IITS General or miscalitomous
THERMAL MYDROLOGY AND REAT FLOW OF BEOWAYS GEOTREMAL
ARLA, MEVADA
Christian Gelich iForzerly Earth Scipace Laboratory,
University of Utab Research Institute, Selt Labe City;

the lest in seich if orderly Earth Belonce Laboratory. University of Read Boseasch Institute, Sait Labe City: presentity they can Recourses Co., 7.0. Boz 7147, San Prescisco, CA 95107-7147)

Inflactions in temperature-depth profiles from forty 150 or thermal gradient boins deline a shallow thermal internal gradient deline as the water calls mbow the face man of flow at the water table. The leffertions are chought to indicate the symmetric and the properties of the state of the series of the leshage were rebeconcied, involving of ordered upwelling occurs could be halpful in asserting the potential for energy production. The systematic nequisition of hydrologic data is excursed as a stendard component of hydrologic data is excursed as a stendard component of hydrologic data is excursed as a stendard component of hydrologic data is excursed as a stendard component of hydrologic data is excursed to the production of hydrologic data is ex

Meteorology

J715 Chemical Desposition
FOCHATER CHEMISTRY IN AN URBAN ATMOSPHERE
J. W. Munger, O. J. Jacob, J. N. Maldman and M. N.
Hoffmannia, Gravirousmattal Engineering Solemes 138-78,
California Institute of Tachnology, Posadens, California,
9122)

J715 Chemical composition and chemical interestions.
LATIDETHAL VARIATION OF TROCOMPRETE GROWN IN A PROTOCHRICAL MASSAC (Laboratory for Figure 19 A PROTOBullan Massac (Laboratory for Figure 19 A Propheres Research and Department of Hachenderi Engineering, State
Thivasity of Haw Tork, Stony Brook, Saw York, 11794),
Lichard W. Straw Tork, Stony Brook, Saw York, 11794),
A Monelly, Variation of Massachus 19 A Manally, Variation 19 A Manally 19 A Manally Variation 19

lichard W. Scraut
A Monally, Verticelly and annually senraged numerical
social of trace gases is the troposphera is used to exceles the verintion of soons as a function of latitude.
Toucease included is the corns hudget area a source
due to doctoment transport of soons from the stratesphere, describe at earth's sutface, north-south
diffusive transport and phetochemical tractions. Sensitivity of calculated soons concentrations to the
source is presented. The model indicates a net photothemical source of orons in the northwee hamisphere and
a met chanical sold to the tropical latitudes. Calculisted vertice of soons concentration with latitude is
sphere, coons). Geophya. Res., Green, Papet 300279

57A5 Oravity Wares, Tidas, and Compressional Wasse A MUNKRIGE MUSSE, OF GRAVITY WAVE ERRAKING AND STRESS YN THE MESCRENEER.

A. Bethscharl, O.F. Strobel, and J.Y. Aprusess iPlease Physics Old-lains, Here's Research Laboracory, Washington, O.G. 21075)

The atreess ganctated by breaking gravity wasse in the wascepbers are coloculated aith a massiral model of stondy wattanity propagating Stratty waves which lookudes new-looght dependent redisting discipation and turbelent viscosity and conduction. The principal finding, grave ||) were do not brask for live of saluan (50 ms as radiative demping pravaots wave amplited acoust with altitude for master retrinal wassingths; || 17) the downward heat fure due to turbulence of breaking warms and turbulent heating through loss of wave energy nould seasorally sylect the global radiative neargy belance; and (3) predicted nous facellatelloe for steady breaking waves in atruspar than tequired by Aprasses et al. [1952] for the seas also instance of the contraction of retry wass breaking may be an loteralitate ordered of otherwise, gracity was attended would prodoce an adiabatic meansphare with a sonal sam valuelty close to the phese speed of the breaking wave.

Elifeulve transport of constituence and motorial

Elifusive transport of constituents and potential temperature by breaking guestly wave turbulenes is shown to be important. In the cases of mittle onlide and etomic organ the wertinal eddy diffusion coefficients are shown to be sentingly functions of their respective chemiani insertates in the mesosphere and four thermosphere. (Oracity waves, wave beneking, mesosphere).

J. Osophya. Res., Green, Faper 300347

Speciais, S.J. dos Campos, S.P., Braell) and O.H. Simosiob Lidar observations of the stratospheric serosal scattering at Seo José dos Campos (23°S, 46°V) show a vary letgs increase to the stratospheric acrosol burden to have occurred in mid-1982. Peak acattering taclos greater than 5 have been observed, as compared with pra-emhanament values between 1.1 and 1.2, representing so loctosase by more than an order of magnitude in particulate stattering. It is concluded that the main source of the dust was the aruption of El Chichón in Maxiso in Latn Macch and early April of 1984. (Pretmaphatic seconic, volcueic acuptions).

Geophys. Fee. Lett., Paper 3(0329)

Oceanography

4760 Sea ire
SENSITIVITY STUDIES WITH A COUPLED ICE-OCEAN MODEL OF
187 MARGINAL ICE ZONE

L.P. Road IResearch Dictaire, Det norske Verifac,
p.8. Road IResearch Dictaire, Det norske Verifac,
p.8. Road IResearch Dictaire, Det norske Verifac,
p.8. Road IResearch Dictaire and Independent of the open ocean as well as the lea. The antiyels cupperlis the senjecture that the upwelling dymemics of least a law edges rets be understood by meeter of a ciaple analytical model. Is cimilarity atth seestel problems this is shown that the ice edge upwelling is determined by the net mess flux at the boundaries of the considered region. The model is used to study the sensitivity of the upwelling dynamics in the marginal ice some is veriation in the storrelling parameters. These parameters consist of combinations of the drag coefficients used in the parameter ice, atmosphere-ceen end ice-sceen. The response is shown to be sensitive in variations in these parameters may give downelling. (Coupled ice-sceen between interfeces the survey of the combined of the dightly different said of parameters may give upwelling with a slightly different said of parameters may give upwelling, (Coupled ice-sceen behavior, enalytic model, (ce-adge upwelling, ite edge action).

J. Goophys. Rose., Greec, Paper 30048

5520 Biantrio fields
LATTUDIMAL AND MACRETS FLOX TUBE EXTENSION OF THE
EUGATORIAL SPEEAD PERSONALITIED
M. A. Abdu (Instituto de Feaquimes Especials - 1878,
Coessino Escicul de Deservolvimento Cientília s Tecmológico - CKPq. 12200 - Eño José dos Campos, Bão Pauio, Breafil, S. T. de Madeloce, sed T. Makemare
A competações selved hes base Cerride dos O' the iomosphera use discovered. It means possessed and predict the approximate duration of a spread P even over the aquator by observations catried out at a in-latitude station altered close to a tomson negest meridional plane. (Spread P, plassa bubble, lettedinal extension of the irregularities).

J. Gamphys. Res., Blue, Paper 2A1704

3535 Interestions Between Naves and Particles
PRECT OSSERVATION OF RADIATION 28LT SLECTRONS
FRECIPITATED BY THE CONFEDILED ISJECTION OF VLY
RICKALS FIRST A GROUND-BARED TRINSMITTER
N. L. Dabof inchased fals Alto Research inberetory;
1251 Kanower St., Eldg. 225, Fals Alto, Dallf. 94308),
J. B. Resgan, S. O. Voce, S. S. Caimes, O. M. Notio was,
J. Mabbilla, S. A. Bellinell (Stanford University), S.
S. 1886, J. Retenfrikis, and S. O. Jelmet (Office of
Navel Inseasch)

Exaferious beit simetrons precipitated by ometrolied
injection of VIJP signals from a ground head triangle:
ter bewe been divently observed for the first time.
These observations wave put of the SECP (Otimulated,
Existing and Baseptic Particles) experiment condessed

sunsitive low sitiude satellite poylood to detect the postlylitation. An outstanding memapia of time-correlated wass and particle date occurred from 8680 to 8740 seconds O.T. on 17 August 1982 when the astellite peeced near the VLF transmitter at Cutler, Melsa (MAA) as it was being modulated with a repeated ON [3-9-1077 (2-9) pattern. During sech of twelve consecutive poises from the transmitter the alectron counting rate increased significantly after start of the 08 partod and reached a manipue about 2 seconds later. The measured unarry apartra revealed their approximately [5 to 50 percent of the sehanted electron flux was concentrated mean the respect mentions for first order cyclotron interaction occurring class to the asgmatic squarer with the occur younghroustic waves switted from the transmitter.

AT 23"B 5. S. Clemashs (Inetituto de Pasquisse Bepeciaie, S.J. dos Campos, S.P., Brasil) and

5585 Airglow
THE EXTREME ULTRAVIOLET DAT AIRGLOW
B. Chahraberli, 7. Paramen, 6. Bowyer and 8. Bimble
(Space Sciences Laboratory, Delversity of California,
Verbeloy, California, 94790); 8. Kumat (inth 4 Space Werkelny, Callyords 94790); B. Rumat (inth & Space Selescos localives, Uniterally of Southers callfornia, Co. Angelse, Callfornia 90087).

Setafilts observations of the serth's extrems ultratiolated and single-wherean 150 sed 1400 Å are described. The stonic spectrum shows lines of 0 fl 1838-439, 353, 801, b17, b73, 718, 834), Us 1 86A, 0 t 1984, 1132, 1104, 1136), Nil 1918, 1085), 8 1 (1134, 1900), and H 1 (1025, 1918, and possibly 975). Fraviously unobserved wesk 0 II lises (515, 482, 470, 4tf) awa, phearwed heine 550 Å. The Lyman-Sirge-Ropfield (LBH) and Birge-Hopfield (RH) bends of Ng batween 900-1100 Å are the deminst volucture lises. Large scale bigh legiteds and equatorial cohenements and hemishperic saymostries awa ovident in the onet smolth 0 II 534, 0 I 909 mod 8 IT 1085 Å lise intwesties.

5515 AUTOTES
AMALTICAL YIGLD OPEOTRUM APPROACH TO BLEGTROS
OMERGY DESIRADATION TO EARTH'S ATMOSPHENE
6. A. Reider (Applied Physics Soction;
Institute of Technology, Benaras Hindu
University, Varanesi, 221005; Indis) and
A. P. Singhal
Analytical spatial yield spectrum approach
has been sphied to calculate the electron
flux, volume sactistion and ionization rates
for momenergotic electrone incides on the
sarth's stoosphere. The results have been
compered with the previous sodel calculotions
of Hantes and Walker [1976] and Benks et al.
[1974]. (Electrons; ionizatioo).
J. Coophys. See., Slue, Fapri 30037

California Institute of Tachnology, Feedens, California, SIL29)

Analyses of Tograter collected by inertial topmetine to the Los Angales busin and the See Josquis VaTley indicated unusually high concentrations of major and state of the Los Angales busin and the See Josquis VaTley indicated unusually high concentrations of major and state of the Los Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales beels, but was approximately equal in the asstern to Angales are t

5345 Ionosphetic disturbances
UNIFIED TERORY OF TIPE I AND TYPE BY IRREGULARITIES
IN THE EQUATORIAL SLECTROST
I. S. Sudan (Laboratory of Plasma Studies, Cornell
University, Ithacs, New York 1A653)
A monlinear unified theory of type I and IY irregulavities is presented which explains their principal
obsetved chesateristics. The power spectrum is
predicted using Rolespotoff type conservation haw for
the power flow in cascading addiss. (type I and fy
loregularities, equatorial alectrojer, nonlinear
unified theory)
J. Geophys. Res., Else, Papes 3A0371

5345 loonspharic disturbances

BFFECT OF AM SLECTRON SEAM OB THE CURRENT-CONVECTIVE
LESTABYLITY
P.K. Chaturwall and S.L. Ossekov (Code 4700, Mauni
Seesarch imboratory, Washington, G.C. 20378)
We consider the possible effects of an electron beam
on the antrant-roosestive lostability in a wesklylonised plasma, sith application to the diffeae
auroral sitmecion. A lisser stability smalysis
including these refeats in presented. It is found
that the presence of an electron beam has negligible
effects on the instability growth rate for the diffuse
auroral lonospheric application. (Slectron beam,
convective lestability, diffuse aurors)
J. Geophys. inc., Slun, Yapor MOSM4

55th Tomosphetic Sietachantee
SHOST WAVELENGYS STABILIZATION DP TWE GRADIENT DRIFT
1857ASFLITY DNE TO WALOGIFF SEEAR
J.O. Rabe (Geophysical and Finese Dynamics Branch,
Flasma Fhysics Dirision, Navel Research isberatory,
Weshington, O.C. 2027), L.C. Lee (Geophysical
factitute, University of Alaska, Faithenks, Aleska
88761)

Hastituta, University of Alaska, Yaithanka, Alaska 188761.)
A conlocal analysis of the gradient drift instability is presented. The new effect included in this theory is the allowaces for an inhomogeneous alantic finid which produces a charact Arift weightly, dr is food that resoluty shear can stabilise the short wavelength modes of the instability, and presentability excits a longer wavelength mode then would be expected based upon local theory. This tesuit may explain the observations of dominant, long wavelength tregularities in the equatorial electrojet indohi at al., 1961, plaff at al., 1982) and be relevant to itregularities in the survey inscription.

5545 Ionospheric Gisturbances on the Generation and Growth or Equatorial Backscattes PLUMES, Y. STRUCTUSING OF THE WEST WALLS OF UPWELL-

INGS
S. T. Teunoda | Radio Physics Laburatory, 581 international, Penilo Parh, CA 94025)
The user wall of large-scale "upwallings" that develop
in the bottosaids of the nightline equatorial y layer
becomes atructured by the wind-driven gradient-drift
instability, the same process that lands to the lorgeation of strictions in barium ion clouds. Upwallings
are intilated by waveline maturations with lone ation of striations in barium ion clouds. Upwellings are initiated by wavelike parturbations with ions epstial wavelengths: -400 be) and are amplified by the collisions! Ravistsh-Taylor instability is and sometimes assisted by the gradient-drift instability in the case of an upwerd moving 7 layer). The westwall structuring process is driven by an eastward mottral vision shanced by reduced dreg during the post-sunset hours and a velocity shear in east-wast build present with the boundaries in east-wast build present with the boundaries in layer. I have said at the boundary places bubbles grow from the west wall. Their characteristics are compared with these of the primary bubbles and discussed in the light of waitering theories. Undertook a questorial irregularities, pieces bubbles, gradient-drift instability! J. Geophys. Pes., Slue, Paper 3A0399

5360 Perticle precipitation SAIELLIE AND GROUND BESTRYATIONS OF A PRE-SUBSIDEM PHASE ON 4 MAY 1977 Aerne Rente and Milite Monte | Geophyelce| Chaervalory, Agrice Rante and Milkle Monte | Geophysics| Chaoryalor \$5-49,600 Sadenhyls, [Inlend)
On 4 May 1977 a polar orbiting low-milliade DMSP satellite pessed close to the flanish flometer stations, at the sems like as an ebsorption bey preseding an asol of subslove was observed. The combined ground and estaillts measurements show that the absorptime bey was characterized by Inlense procipilation of energit of settings it the inner border of the compressed places shout. The

practipitation occurred in a macrow band of fatitate, perhaps less than 50 km wide. We suggest that the pro-ber practitation was due to strong pitch angle diffusion sud/or meater of onergotic sietians at the inner berdet of the piases sheet, probably from the sules tedistion some. (Substorm, energetic particle practicition).

J. Osophys. iss., Size, Papes 340247

A THEORETICAL SPERACE TO THE MORPHOLOGY ACO THE DYNAMICS OF DIFFORE AUPORAL SORES

O. FOREsias INNET/CEFF, 65-40 rus Ou Officeral Loclerc, 99111 - 1esp-lea-Moultesum, france) and M. Blanc.
Olrect observations of the high-lacitude locumphere have netchilahed the continuous presence of lerge-scale emissions, referred to se diffuse surcras. Begisting located structures, such as distrets area, we locue upon a quantitative description of the coupling of the large-scale processes of convection and diffuse precipitation.

The transport of 100 sV-10 heV electrons from the gammagnatic cell catchward by the convection electric field, each their olteh-sughe diffusion into the loss-come by ware particle interactions, ere belinted to be the main cause of diffuse surcraf electron pracipitation. A self-consistent treatment belanting wave gammaration sud petricie diffusion appress to be exilt beyond the present each of the art.

tion. A self-consistent treatment belenting wave ganaration and patticle diffusion appears to be still
beyond the present state of the sit.

You the mein purpose of magneteaphetic convection
modelling, we propose a simplified approach to this
problem, and test its tailoity against direct observations of the location and Oynesics of diffuse sucoral emissions. Oning besitally the strong pitch-angle
diffusion limit is the way proposed by sement (1969),
we derive a set of Yluid nquations describing the threadimensional transport of plasma-sheet electrons. Their
integration provides the include and local time distribution of precipitation fluxus and characteristic enetgion at the top of the lonosphara as a function of the
large-scale dawn to dush electrostatic patential drop.

The raituleted expension of the surport of al with
magnetic activity deduced from our model, approaches the
experimental results. So this simplified theoretical
study paratists as to reproduce and cepiain the main characteristics of rha diffuse subtoral tone. Securor, for
high values of magnetic activity, the licercical results are found to be shifted polouted relative to the
observations. St suggests that the sesumption of strong
pitch-angle Olifusion overcontimetes the efficiency of
wove-particle interactione. (Electron practipitation,
convection electric field, diffuse surcess).

J. Geophys. Soc., Sus. Paper 340335

on the formation of data the thought in the F-Region within the first the formation of a trough that the formation of a trough that formed is the incoherent scatter reder observations of a trough that formed is the incoherent scatter reder observations of a trough that formed is the incoherent scatter reder observations of a trough that formed is the incoherent scatter reder observations of a trough the temporal differential-Boppier observations of latitudical variations of total electron content made at Hillsions fill over the two-year pariod 1971-1973, during which data were collected for over f.000 passes of the polar-orbiting Many Manighton Beries satellites. These showed that the formation of a trough in the dayline is a rare bet not unique event. Buch trough in the dayline is a rare bet not unique event. Buch trough in the dayline is a rare bet not unique event. Buch trough in the dayline is a rare bet not only a serving campaign at A < 68°; all of these were seen better the serving the course of the afternoon. This suggests that they represent the angular of wome externally impressed effect such as as intense electric fined as was found to be the case on Se February 1974. We suggest that these troughs are 18e lonospheric valuature of electric finids impressed into the tonospheric valuature of electric finids impressed into the tonosphere will be charge distribution in the magnetosphere will be partial ring current.

559) General or elscalianeous

SOUSCER-ACCELERATED PAPTICLES OBSERVED ON ISIS

E.O. James (Communications Persearch Centre, Department
of Communications, Ottawa, Canada Y28652)

The soft-particle apestromaters charact the

1, 1 1/2 I And TOTT I delet

SOUNCER-Eccelerist of Particles (SAP), 1.0. Yiures of
electrons and loca eccreted by the 100-uses
transmitter pulse (position) peak power: 400 W). Plures
of up to 10 starf sv'cs' sec' er observed.

Typical highest ion and cleatron energies are several
oundred electronycles and 100-200 ev, respectively.

SAP electron fluxes on ISIS II are energies are several
oundred electronycles on 100-200 ev, respectively.

SAP electron fluxes on ISIS II are energies are several
respectory, for legyrofrequency; 1, 200 and the oblique
respectory, for legyrofrequency; 1, 100 fluxes are present
from the lowest acounder frequency [0.1 Miks] up to the
grenter of for and for. Electrone are observed in
pitch sugles mear 90 while ions are present at all
pitch angles. The observations can be interpreted
using a endel of particle motion and spaceraft do
potential both induced by the intense ry Yield
iv 100 Va). The ion results indicate that at
f > for for for a negative potential of shoul 100 V is on
the spectrumic, whereas at f > for You're
la much sealier. ISIS-1 data from equatorial particle
conditions show that statzons remain energized for a
faw millseconds after the sed of the rf pulse.
[Partsofam, sounder-accelerated]
J. Geophys. isa., Sier, Paper Ja0785

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